

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/874,355
Attorney Docket No.: Q64810

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A fluorescent-light image display method comprising:
obtaining a fluorescent-light image based on the strength of fluorescent-light emitted from a target area upon irradiation thereof by a stimulating-light,
assigning at least one of color data and brightness data to a computed-image based on said fluorescent-light image and forming a tissue-state image representing mainly the state of the tissue in the target area,
assigning to said fluorescent-light image at least one of color data and brightness data corresponding to the at least one of color data and the brightness data assigned to said tissue-state image and forming a tissue-form image representing mainly the form of the tissue in the target area, such that said tissue-state image and said tissue-form image are obtained separately,
combining the tissue-state image and the tissue-form image to form a composite-image,
and
displaying the composite-image.
2. (original): A fluorescent-light image display method as defined in claim 1, wherein the computed-image is based on the ratio of one to another of two wavelength components among a plurality of wavelength components of said fluorescent-light image, each of said wavelength components representing a different wavelength band of fluorescent light.

3. (original): A fluorescent-light image display method as defined in claim 1, further comprising computing a statistical quantity of the pixel values of one of the obtained images and assigning display gradation of the brightness data based on said statistical quantity.

4. (original): A fluorescent-light image display method as defined in claim 3, wherein the statistical quantity is computed from a desired portion of said one of the obtained images.

5. (previously presented): A fluorescent-light image display method as defined in claim 3, further comprising,

computing a coefficient based on the statistical quantity,
multiplying said one of the obtained images by said computed coefficient, and
assigning said display gradation of the brightness data to said one of the obtained images that has been multiplied by the coefficient.

6. (previously presented): A fluorescent-light image display method as defined in claim 3, further comprising,

determining a gradation processing function representing the display gradation of the brightness data based on the statistical quantity, and

assigning the display gradation of the brightness data, based on the determined gradation processing function, to said one of the obtained images.

7. (original): A fluorescent-light image display method as defined in claim 1, wherein the color data is a chromaticity occurring in a color mixing system or a color appearance system, each being one of color specification systems.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/874,355
Attorney Docket No.: Q64810

8. (original): A fluorescent-light image display method as defined in claim 1, wherein the brightness data is a degree of brightness according to a color mixing system or a color appearance system, each being one of color specification systems, or luminance according to an image signal system.

9. (currently amended): A fluorescent-light image display method comprising:
obtaining a fluorescent-light image based on strength of fluorescent-light emitted from a target area upon irradiation thereof by a stimulating-light,

obtaining a reflected-light image based on strength of reflected-light reflected from the target area upon irradiation thereof by a reference light,

assigning at least one of color data and brightness data to a computed-image based on said fluorescent-light image and forming a tissue-state image representing mainly the state of the tissue in the target area,

assigning to said reflected-light image at least one of color data and brightness data corresponding to the at least one of color data and the brightness data assigned to said tissue-state image and forming a tissue-form image representing mainly the form of the tissue in the target area, such that said tissue-state image and said tissue-form image are obtained separately,

combining the tissue-state image and the tissue-form image to form a composite-image,
and

displaying the composite-image.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/874,355
Attorney Docket No.: Q64810

10. (original): A fluorescent-light image display method as defined in claim 9, wherein the computed-image is based on the ratio of one to another of two wavelength components among a plurality of wavelength components of said fluorescent-light image, each of said wavelength components representing a different wavelength band of fluorescent light.

11. (original): A fluorescent-light image display method as defined in claim 9, wherein the computed-image is based on ratio between said fluorescent-light image and said reflected-light image.

12. (original): A fluorescent-light image display method as defined in claim 9, further comprising computing a statistical quantity of the pixel values of one of the obtained images and assigning display gradation of the brightness data based on said statistical quantity.

13. (original): A fluorescent-light image display method as defined in claim 12, wherein the statistical quantity is computed from a desired portion of said one of the obtained images.

14. (previously presented): A fluorescent-light image display method as defined in claim 12, further comprising,

computing a coefficient based on the statistical quantity,
multiplying said one of the obtained images by said computed coefficient, and assigning said display gradation of the brightness data to said one of the obtained images that has been multiplied by the coefficient.

15. (previously presented): A fluorescent-light image display method as defined in claim 12, further comprising,

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/874,355
Attorney Docket No.: Q64810

determining a gradation processing function representing the display gradation of the brightness data based on the statistical quantity, and

assigning the display gradation of the brightness data, based on the determined gradation processing function, to said one of the obtained images.

16. (original): A fluorescent-light image display method as defined in claim 9, wherein the color data is a chromaticity occurring in a color mixing system or a color appearance system, each being one of color specification systems.

17. (original): A fluorescent-light image display method as defined in claim 9, wherein the brightness data is a degree of brightness according to a color mixing system or a color appearance system, each being one of color specification systems, or luminance according to an image signal system.

18. (currently amended): A fluorescent-light image display apparatus comprising:
fluorescent-light image obtaining means for obtaining a fluorescent-light image based on the strength of fluorescent light emitted from a target area upon irradiation thereof by a stimulating-light,

tissue-state image forming means for assigning at least one of color data and brightness data to a computed-image based on said fluorescent-light image and forming a tissue-state image representing mainly the state of the tissue in the target area,

tissue-form image forming means for assigning to said fluorescent-light image at least one of color data and brightness data corresponding to the at least one of color data and the brightness data assigned to said tissue-state image and forming a tissue-form image representing

mainly the form of the tissue in the target area, such that said tissue-state image and said tissue-form image are obtained separately,

composite-image forming means for combining the tissue-state image and the tissue-form image to form a composite-image, and

display means for displaying the composite-image formed by said composite-image forming means.

19. (original): A fluorescent-light image display apparatus as defined in claim 18, wherein the computed-image is based on the ratio of one to another of two wavelength components among a plurality of wavelength components of said fluorescent-light image, each of said wavelength components representing a different wavelength band of fluorescent light.

20. (previously presented): A fluorescent-light image display apparatus as defined in claim 18, further comprising:

statistical-quantity computing means for computing a statistical quantity of the pixel values of one of the obtained images, and

gradation processing means for assigning display gradation of the brightness data based on said statistical quantity.

21. (original): A fluorescent-light image display apparatus as defined in claim 20, wherein said statistical-quantity computing means computes the statistical quantity from a desired portion of said one of the obtained images.

22. (previously presented): A fluorescent-light image display apparatus as defined in claim 20, wherein said gradation processing means computes a coefficient based on the statistical

AMENDMENT UNDER 37 C.F.R. § 1.111

U.S. Application No.: 09/874,355

Attorney Docket No.: Q64810

quantity, multiplies said one of the obtained images by said computed coefficient, and assigns said display gradation of the brightness data to said one of the obtained images that has been multiplied by the coefficient.

23. (original): A fluorescent-light image display apparatus as defined in claim 20, wherein said gradation processing means determines a gradation processing function representing the display gradation of the brightness data based on the statistical quantity, and assigns the display gradation of the brightness data, based on said determined gradation processing function, to said one of the obtained images.

24. (original): A fluorescent-light image display apparatus as defined in claim 20, further comprising bit-shifting means for bit-shifting the pixel values of said one of the obtained images when each of said pixel values is represented by data of 9 bits or more, so that each of said pixel values is represented by data of 8 bits or less,

wherein said statistical-quantity computing means computes the statistical quantity based on said bit-shifted data.

25. (original): A fluorescent-light image display apparatus as defined in claim 20, wherein the gradation processing means is capable of being turned ON and OFF.

26. (original): A fluorescent-light image display apparatus as defined in claim 20, wherein said statistical quantity is a combination of a plurality of values including an average of the pixel values or the largest pixel value.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/874,355
Attorney Docket No.: Q64810

27. (original): A fluorescent-light image display apparatus as defined in claim 18, wherein the color data is a chromaticity occurring in a color mixing system or a color appearance system, each being one of color specification systems.

28. (original): A fluorescent-light image display apparatus as defined in claim 18, wherein the brightness data is a degree of brightness according to a color mixing system or a color appearance system, each being one of color specification systems, or luminance according to an image signal system.

29. (original): A fluorescent-light image display apparatus as defined in claim 18, wherein when combining the tissue-state image and the tissue-form image to form the composite-image, for cases in which the number of pixels of the two images differ, the composite-image forming means converts the number of pixels of each image to the number of pixels of one of either of the two images before forming the composite-image.

30. (original): A fluorescent-light image display apparatus as defined in claim 18, wherein said fluorescent-light image display apparatus is provided in a form of an endoscope provided with an insertion portion to be inserted into a living body.

31. (original): A fluorescent-light image display apparatus as defined in claim 18, wherein a light source of the stimulating-light is a GaN type semiconductor laser, and the wavelength band of the stimulating-light is within the 400-420 nm wavelength range.

32. (currently amended): A fluorescent-light image display apparatus comprising:

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/874,355
Attorney Docket No.: Q64810

fluorescent-light image obtaining means for obtaining a fluorescent-light image based on strength of fluorescent light emitted from a target area upon irradiation thereof by a stimulating-light,

reflected-light image obtaining means for obtaining a reflected-light image based on strength of the reflected-light reflected from the target area upon irradiation thereof by a reference light,

tissue-state image forming means for assigning at least one of color data and brightness data to a computed-image based on said fluorescent-light image and forming a tissue-state image representing mainly the state of the tissue in the target area,

tissue-form image forming means for assigning to said reflected-light image at least one of color data and brightness data corresponding to the at least one of color data and the brightness data assigned to said tissue-state image and forming a tissue-form image representing mainly the form of the tissue in the target area, such that said tissue-state image and said tissue-form image are obtained separately,

\ composite-image forming means for combining the tissue-state image and the tissue-form image to form a composite-image, and

display means for displaying the composite-image formed by said composite-image forming means.

33. (original): A fluorescent-light image display apparatus as defined in claim 32, wherein the computed-image is based on the ratio of one to another of two wavelength

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/874,355
Attorney Docket No.: Q64810

components among a plurality of wavelength components of said fluorescent-light image, each of said wavelength components representing a different wavelength band of fluorescent light.

34. (original): A fluorescent-light image display apparatus as defined in claim 32, wherein the computed-image is based on ratio between said fluorescent-light image and said reflected-light image.

35. (previously presented): A fluorescent-light image display apparatus as defined in claim 32, further comprising,

statistical-quantity computing means for computing a statistical quantity of the pixel values of one of the obtained images, and

gradation processing means for assigning display gradation of the brightness data based on said statistical quantity.

36. (original): A fluorescent-light image display apparatus as defined in claim 35, wherein said statistical-quantity computing means computes the statistical quantity from a desired portion of said one of the obtained images.

37. (previously presented): A fluorescent-light image display apparatus as defined in claim 35, wherein said gradation processing means computes a coefficient based on the statistical quantity, multiplies said one of the obtained images by said computed coefficient, and assigns said display gradation of the brightness data to said one of the obtained images that has been multiplied by the coefficient.

38. (original): A fluorescent-light image display apparatus as defined in claim 35, wherein said gradation processing means determines a gradation processing function

AMENDMENT UNDER 37 C.F.R. § 1.111

U.S. Application No.: 09/874,355

Attorney Docket No.: Q64810

representing the display gradation of the brightness data based on the statistical quantity, and assigns the display gradation of the brightness data, based on said determined gradation processing function, to said one of the obtained images.

39. (original): A fluorescent-light image display apparatus as defined in claim 35, further comprising a bit-shifting means for bit-shifting the pixel values of said one of the obtained images when each of said pixel values is represented by data of 9 bits or more, so that each of said pixel values is represented by data of 8 bits or less,

wherein said statistical-quantity computing means computes the statistical quantity based on said bit-shifted data.

40. (original): A fluorescent-light image display apparatus as defined in claim 35, wherein the gradation processing means is capable of being turned ON and OFF.

41. (original): A fluorescent-light image display apparatus as defined in claim 35, wherein said statistical quantity is a combination of a plurality of values including an average of the pixel values or the largest pixel value.

42. (original): A fluorescent-light image display apparatus as defined in claim 32, wherein the color data is a chromaticity occurring in a color mixing system or a color appearance system, each being one of color specification systems.

43. (original): A fluorescent-light image display apparatus as defined in claim 32, wherein the brightness data is a degree of brightness according to a color mixing system or a color appearance system, each being one of color specification systems, or luminance according to an image signal system.

AMENDMENT UNDER 37 C.F.R. § 1.111

U.S. Application No.: 09/874,355

Attorney Docket No.: Q64810

44. (original): A fluorescent-light image display apparatus as defined in claim 32, wherein when combining the tissue-state image and the tissue-form image to form the composite-image, for cases in which the number of pixels of the two images differ, the composite-image forming means converts the number of pixels of each image to the number of pixels of one of either of the two images before forming the composite-image.

45. (original): A fluorescent-light image display apparatus as defined in claim 32, wherein said fluorescent-light image display apparatus is provided in a form of an endoscope provided with an insertion portion to be inserted into a living body.

46. (original): A fluorescent-light image display apparatus as defined in claim 32, wherein a light source of the stimulating-light is a GaN type semiconductor laser, and the wavelength band of the stimulating-light is within the 400-420 nm wavelength range.